

## **REMARKS**

Claims 1-23, 25-27, 43 and 44 remain pending in the application. Claims 25-27 and 44 have been withdrawn from consideration. Claims 1-7, 11-15, 18-20, 23 and 43 stand rejected. Claims 8-10, 16, 17, 21 and 22 are objected to. In response to the Examiner's objection to hatching representing the upper ice layer 464 of Figure 5, Applicant has amended Figure 5 and the specification, to remove the hatching and reference to the hatching, respectively. No new matter is added to the Figure 5 or to the specification with these amendments.

### **1. Election/Restrictions**

The Examiner has acknowledged Applicant's election of Group 1, Species 1 (claims 1-27), treating Applicant's election as an election without traverse and stating that Applicant did not distinctly and specifically point out the supposed errors in the restriction requirement. Respectfully, we disagree. Applicant's Response of August 11, 2003 amended claim 1 to a generic form. Applicant has stated the belief that the amendment to claim 1, along with amendments to claims 2-13 and 15, removed the necessity for species election, and has requested consideration of all claims. Therefore, Applicant requests that the August 11, 2003 election of Group I, Species I be treated as an election with traverse.

The Examiner further states that claims 25-27 and 44 read on Species II, and has therefore withdrawn the claims from consideration. Applicant notes the withdrawal; however, claim 1, as amended August 11, 2003, is a generic claim demonstrated herein below to be allowable. Should the Examiner allow claim 1, Applicant requests consideration of all of claims 1-23, 25-27, 43 and 44.

### **2. Drawings**

FIG. 5 is objected to as having hatching to depict the upper ice layer 464. Accordingly, Applicant submits herewith 1 sheet of corrected drawings including corrected FIG. 5. The hatching formerly depicting upper ice layer 464 has been removed. No new matter is added to FIG. 5.

### **3. Claim Rejections – 35 USC § 102(b)**

**4.** Claims 1-3, 18-20 and 23 are rejected under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,586,213, issued December 17, 1996 to Bridges et al.

(hereinafter, “Bridges ‘213”). Respectfully, Applicant disagrees and traverses the rejection. To anticipate a claim, Bridges ‘213 must teach every element of the claim and “the identical invention must be shown in as complete detail as contained in the … claim.” *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989). Bridges ‘213 does not teach every element of Applicant’s claims 1-3, 18-20 and 23, as demonstrated herein below.

Claims 1-3: Bridges ‘213 teaches heating of a *subsurface* formation (see Abstract). For example, Bridges ‘213 describes “improved ionic contact media for making and maintaining conductive contact between electrodes and the soil in ohmic heating apparatus” (col. 4, line 67 – col. 5, line 2). Applicant’s claims 1-3, in contrast, disclose a system for preventing ice formation on a *surface* of a solid object (emphasis added). Bridges further teaches electrodes *inserted into* bore holes *in* the formation to be heated (col. 5, lines 21, 28 and 35, among others), “emplaced so that they *protrude from the surface*” (col. 7, lines 37-38, emphasis added), and shown in Figure 4 to be vertically inserted into the soil (see also col. 6, lines 5-7), and in Figure 5 to be “*substantially underground*” (col. 6, lines 9-10, emphasis added). Applicant’s claims 1-3 disclose a first electrode disposed *on* the surface and a second electrode proximate to the first electrode. For these reasons, among others not specifically discussed herein, Bridges ‘213 does not teach every element of Applicant’s claim 1. Claims 2 and 3 depend from base claim 1 and therefore inherit its limitations. Therefore, Bridges also fails to teach or suggest every element of claims 2 and 3. Applicant respectfully requests reconsideration and allowance of claims 1-3.

Claims 18-20: Bridges ‘213 also fails to anticipate Applicant’s claims 18-20. Applicant’s claim 18 depends from claim 15, which in turn depends from claim 1. Applicant has shown, above, that claim 1 is allowable over Bridges ‘213; therefore, dependent claim 18 is also allowable over Bridges ‘213 for at least the reasons argued above. However, claims 18-20 are further allowable over Bridges ‘213 for additional reasons.

Claims 18-20 inherit features of claim 15 not taught or suggested by Bridges ‘213. For example, claim 15 describes a second electrode covering a first electrode. Nowhere does Bridges ‘213 teach or suggest a second electrode covering a first electrode. Rather, Bridges ‘213 describes a vertical pair of electrodes (see col. 14, line 62, and Figs. 4, 5 and 11, among other examples). Additionally, Bridges ‘213 fails to teach a porous insulator layer forming

the interelectrode space, as in claim 18. As is known in the art, an insulator functions “to isolate; especially: *to separate from conducting bodies* by means of nonconductors so as to prevent transfer of electricity, heat, or sound” (Merriam-Webster Dictionary, 2003, Merriam-Webster, Inc., emphasis added). In contrast, Bridges ‘213 seeks to “provide improved ionic contact media for *making and maintaining conductive contact between electrodes and soil in ohmic heating apparatus for heating the soil*”(Col. 4, line 66 – col. 5, line 2, emphasis added). Furthermore, Bridges ‘213 suggests coating a segment of the electrode with an electrically insulating grout *where an electrically nonconductive interface is required*. (see col. 11, lines 61-65), for example, “the upper part of the casing is electrically insulated with insulation layer 122 as required to prevent heating of the upper layers of the earth”(col. 13, lines. 26-28). Were the space between Bridges ‘213 electrodes formed of an insulator layer, additional insulation layer 122 would be unnecessary.

Bridges ‘213 further fails to teach a porous insulator layer having a pore space occupying a range between 0 and 100 percent of the total volume, or a range of from 50 to 70 percent of the total volume, as described in Applicant’s claims 19 and 20, respectively. As shown above, Bridges ‘213 does not teach a porous insulator layer disposed between two electrodes, and so mentions no range of porosity of such insulator layer.

For the reasons argued above, among other reasons not specifically laid out herein, Applicant contends that claims 18-20 are allowable. Applicant requests reconsideration and allowance of claims 18-20.

Claim 23: Claim 23 also stands rejected as being anticipated by Bridges ‘213. Again, Applicant respectfully disagrees. Claim 23 depends from claim 1, and is therefore not anticipated by Bridges ‘213 for the same reasons that claim 1 is not anticipated by Bridges ‘213. Furthermore, Bridges ‘213 does not teach or suggest the surface of the solid object including the first electrode, as in claim 23. Bridges ‘213 teaches inserting two electrodes through a surface and into subsurface soil or a subsurface formation. For at least these reasons, Applicant requests reconsideration and allowance of claim 23.

5. Claims 1 and 13-15 stand rejected as being anticipated by U.S. Patent No. 4,376,598, issued March 15, 1983 to Brouns et al (hereinafter, “Brouns”). Applicant respectfully disagrees and traverses the rejection. To anticipate a claim, Brouns must teach every element of the claim and “the identical invention must be shown in as complete detail

as contained in the ... claim." *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989). As demonstrated herein below, Brouns does not teach every element of Applicant's claims 1 and 13-15.

Claim 1: As with Bridges '213, Brouns teaches heating a soil mass between two electrodes *inserted into* the soil (see Abstract), not a system for preventing ice formation on a surface of a solid object. Brouns does not teach a first electrode disposed *on* the surface, but rather, "one or more pairs of electrodes placed *in* the soil" (col. 3, lines 2-3), the electrodes being "suspended in generally upright positions" (col. 3, lines 33-34). Brouns' Figures 3 and 4 demonstrate a pair of vertically-placed electrodes 10 projecting through the soil 15 (see col. 4, lines 1-2 for description of reference numbers). For at least this reason, Applicant believes that claim 1 is allowable over Brouns, and requests reconsideration and allowance of claim 1.

Claims 13-15: Brouns fails to teach a first electrode disposed on a first portion of a surface and a second electrode disposed on a second portion of a surface, as in claim 13. As shown above, Brouns teaches electrodes inserted *into* the soil. Additionally, claim 13 depends from claim 1, shown above to be unanticipated by Brouns. For at least the reasons described herein, claim 13 is not anticipated by Brouns. Hence, Applicant requests reconsideration and allowance of claim 13.

Applicant's claim 14 describes a system as in claim 13, wherein the first electrode and the second electrode are interdigitated. Nowhere does Brouns teach or suggest interdigitated electrodes. The electrodes of Brouns are shown, in contrast, to be inserted into the soil in an upright position in each of Figures 1-6. There is no suggestion within Brouns that electrodes are interdigitated; it is therefore unreasonable to modify Brouns to render claim 13. Claim 14 depends ultimately from claim 1 and therefore inherits the limitations shown above to be patentable over Brouns. Accordingly, Applicant submits that claim 14 is allowable over Brouns. Reconsideration and allowance of claim 14 is requested.

Claim 15 is also patentable over Brouns. Claim 15 describes a second electrode covering the first electrode. Brouns does not teach or suggest electrodes covering one another, but specifies electrodes suspended in generally upright positions spaced from one another from an insulated cover or dome (col. 3, lines 33-35). Additionally, and as described above, Brouns does not teach all the features of claim 1. Claim 15 ultimately depends from claim 1, therefore, claim 15 is not anticipated by Brouns not only for the reasons described in

this section, but also because Brouns does not anticipate claim 1. Consequently, Applicant requests reconsideration and allowance of claim 15.

6. Claims 1-2, 4 and 43 stand rejected as being anticipated by U.S. Patent No. 4,651,825, issued March 24, 1987 to Wilson (hereinafter, "Wilson"). Respectfully, Applicant disagrees and traverses the rejection. To anticipate a claim, Wilson must teach every element of the claim and "the identical invention must be shown in as complete detail as contained in the ... claim." *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989). Wilson does not teach every element of Applicant's claims 1-2, 4 and 43, as demonstrated herein below.

Claims 1-2: Wilson does not teach a system for preventing ice formation on a surface of a solid object, comprising a first electrode disposed on the surface; a second electrode proximate to the first electrode; an interelectrode space separating the first and second electrode; and a power source connected to the first and second electrodes, the power source capable of providing a voltage with sufficient power to prevent freezing of a liquid water layer in the interelectrode space (claim 1). Rather, Wilson discloses a method and apparatus for enhancing the production of hydrocarbonaceous fluid from a subterranean reservoir (col. 2, lines 23-24), including *at least three electrodes extending into a reservoir* (col. 3, lines 26-27, 29-30 and 33-34). For at least these reasons, Wilson does not anticipate claim 1 or dependent claim 2. Applicant therefore requests reconsideration and allowance of claims 1 and 2.

Claims 4 and 43: Claim 4 depends from claim 43, which in turn depends from claim 1. Therefore, Claims 4 and 43 are allowable at least for the reason that they depend from allowable base claim 1. Applicant requests reconsideration and allowance of claims 4 and 43.

7. Claims 1-2, 11-15, 18 and 43 stand rejected under 35 USC 102(b) as being anticipated by U.S. Patent No. 5,330,291, issued July 19, 1994 to Heath et al. (hereinafter, "Heath"). Applicant respectfully disagrees and traverses the rejection. To anticipate a claim, Heath must teach every element of the claim and "the identical invention must be shown in as complete detail as contained in the ... claim." *MPEP 2131* citing *Verdegaal Bros. V. Union*

*Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989). Heath does not teach every element of Applicant's claims 1-2, 11-15, 18 and 43.

Claims 1-2: Heath discloses "...a method of treating solid earthen material compris[ing] the steps of: (a) inserting a plurality of electrodes into a region of solid earthen material to be treated; and (b) applying at least six phases of voltages to corresponding ones of the electrodes to create current paths between pairs of the electrodes" (col. 2, lines 35-41). Applicant submits that Heath's method of treating solid earthen material comprising inserting electrodes *into* the earthen material does not teach Applicant's system for preventing ice formation on a surface of a solid object, including Applicant's first electrode disposed *on the surface*. Furthermore, Heath does not teach a liquid water layer in the interelectrode space of claim 1. Rather, Heath describes inserting electrodes into solid earthen material and creating current paths between pairs of the electrodes *and through the region of material* (col. 2, lines 40-42), further explaining that solid earthen material "means fragmental material composing part of the surface of the globe...[and] includes fine, densely packed particles having moisture interspersed between the particles, ground, dirt, sand, soil, sludge, slurry, mud..." etc. (col. 2, lines 45-48). The solid earthen material between Heath's electrodes is different from the liquid water layer in the interelectrode space of Applicant's claim 1. For at least these reasons, Applicant submits that claim 1 is allowable. As claim 2 depends from allowable claim 1, claim 2 is also allowable. Applicant therefore requests reconsideration and allowance of claims 1 and 2.

Claims 11-15: Claims 11-15 ultimately depend from claim 1, and are therefore allowable at least because they depend from an allowable base claim. Additionally, Heath fails to disclose the following elements of Applicant's claim 13:

- an electrically nonconductive surface;
- the first electrode disposed on a first portion of the surface, and
- the second electrode disposed on a second portion of the surface.

Applicant again submits that electrodes inserted *into* earthen material are different than electrodes disposed *on* a surface. Furthermore, Heath describes applying voltages to electrodes inserted into solid earthen material to create current paths between pairs of electrodes and through the region of material. This solid earthen material of Heath is

different from the liquid water layer of claim 13. Applicant submits that claim 13 is allowable over Heath, for at least these reasons.

Claim 14 depends from claim 13, and so inherits not only elements of allowable base claim 1, but also elements of allowable claim 13. Furthermore, claim 14 describes a system wherein the first electrode and the second electrode are interdigitated. In contrast, Heath describes arranging the electrodes in a geometrical configuration having *diametrically opposing pairs* of electrodes (col. 2, lines 52-54, emphasis added), or alternately “six electrodes arranged in a substantially equilateral hexagon”(col. 18, lines 3-4). This is different from the interdigitated first and second electrode of claim 14. For at least the reasons above, claim 14 is believed allowable.

Claim 15 describes a system wherein the second electrode covers the first electrode, and the second electrode is exposed to water and is porous to water. Heath describes the geometric/hexagonal configurations described above. Nowhere does Heath teach one electrode covering another. For at least this reason, combined with the dependence of claim 15 from an allowable base claim, Applicant contends that claim 15 is allowable.

Applicant respectfully requests reconsideration and allowance of each of claims 11-15.

Claim 18: Claim 18 depends from claim 15 and ultimately from claim 1. Applicant has shown that both claim 15 and claim 1 are allowable over Heath. Claim 18 is therefore allowable because it depends from an allowable base claim and because it inherits features of allowable claim 15. However, claim 18 is additionally allowable because Heath fails to describe a porous insulator layer disposed between the first electrode and the second electrode, the porous insulator layer forming the interelectrode space and being porous to water. The space between the electrodes of Heath (identified by the Examiner in Figure 13, for example) is occupied by solid earthen material, for example, earthen material 30 of Fig. 6. Sufficient voltage is applied to electrodes to heat earthen material to a temperature sufficient to substantially remove volatile and semi-volatile contaminants from the material (col. 8, lines 40-52). In light of these arguments, Applicant contends that claim 18 is allowable over Heath, and requests reconsideration and allowance of claim 18.

Claim 43: Applicant submits that Heath does not teach or suggest the elements of claim 43. Claim 43 depends from claim 1, and is therefore allowable at least because it

depends from an allowable base claim. Applicant respectfully requests reconsideration and allowance of claim 43.

### 8. Claim Rejections – 35 USC § 103

The following is a quotation from the MPEP setting forth the three basic criteria that must be met to establish a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP, §2142, citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

9. Claims 3 and 5 stand rejected as being unpatentable over Wilson. Applicant has shown (above) that claim 1 is patentable over Wilson. As claims 3 and 5 depend from allowable base claim 1, claims 3 and 5 are also patentable over Wilson, which neither teaches nor suggests all the limitations of claim 3 or claim 5. Furthermore, the MPEP states the following regarding obviousness-type rejections under 35 U.S.C. 103:

In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned" *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992).

Wilson is neither in the field of Applicant's endeavor, nor reasonably pertinent to the problem with which the present application ("the '555 application") is concerned. Wilson, teaching "A method and apparatus for *enhancing the production of a hydrocarbonaceous fluid from a subterranean geologic reservoir containing same* using electrical heating by *employing at least three electrodes* between the injection wellbore and production wellbore and passing electricity only between the three electrodes" (Abstract, emphasis added), is both structurally and functionally different from the embodiments of the '555 application. Further evidence demonstrating the unsuitability of Wilson as a reference under 35 U.S.C. § 103 is demonstrated by the different Patent Office classifications assigned to Wilson and the '555 Application. The '555 Application has been assigned class 219 (Electric heating), while Wilson has been assigned class 166 (Wells).

In light of the arguments presented in this section 9 and in section 6 above, Applicant requests reconsideration and allowance of claims 3 and 5.

**10.** Claims 6 and 7 stand rejected as being unpatentable over Bridges '213 in view of U.S. Patent 5,012,868 to Bridges (hereinafter, "Bridges '868"). The Examiner states that Bridges '213 discloses substantially all the features of the claimed invention except a current density range from 1 to 100 mA/cm<sup>2</sup> in the interelectrode space. Respectfully, Applicant disagrees. Applicant has shown above that Bridges '213 does not teach every feature of claim 1; therefore, claim 1 is allowable over Bridges '213. Claims 6 and 7 are also allowable over Bridges '213 at least because they depend from allowable base claim 1. Thus, Applicant contends that Bridges '213 in view of Bridges '868 fails to teach or suggest all of the limitations of claims 6 and 7.

Furthermore, the MPEP states the following regarding obviousness-type rejections under 35 U.S.C. 103:

In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned" *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992).

Applicant submits that neither of the Bridges references are in the field of the '555 application, nor are they reasonably pertinent to the problem with which the '555 application is concerned. Bridges '868 teaches a method and apparatus for **corrosion inhibition** in an electromagnetic heating system (see Abstract), and is classified by the Patent Office under classes 166 (Wells) and 204 (Chemistry: Electrical and Wave Energy). As discussed above, Bridges '213 seeks to "provide improved ionic contact media for making and maintaining conductive contact between electrodes and soil in ohmic heating apparatus for heating the soil"(col. 4, line 66 – col. 5, line 2), and, as with Bridges '868, is both functionally and structurally different from the '555 application.

In light of the arguments presented in this section 10 and in section 4 above, Applicant respectfully requests reconsideration and allowance of claims 6 and 7.

## **11. Claim Objections**

Claims 8-10, 16-17 and 21-22 are objected to as being dependent upon a rejected base claim, however, the Examiner has indicated that these claims would be allowable if rewritten

in independent form including all of the limitations of the base claim and any intervening claims. Applicant submits that each of claims 8-10, 16-77 and 21-22 is now allowable, at least for the reason that they depend from allowable base claim 1. Applicant respectfully requests withdrawal of the Examiner's objection and allowance of all claims.

#### **12. Allowable Subject Matter**

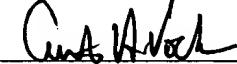
Applicant appreciates the Examiner's acknowledgement of allowable subject matter contained in claims 8-10, 16-17 and 21-22.

In view of the above Amendment and Remarks, Applicant has addressed all issues raised in the Office Action dated August 29, 2003, and respectfully solicits a Notice of Allowance for claims 1-23, 25-27, 43 and 44 (consideration and allowance of claims 25-27 and 44 being requested upon allowance of generic claim 1). Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

Applicant believes that a one month extension fee is the only fee due; however, should any additional fees be deemed necessary in connection with this Response, the commissioner is hereby authorized to charge deposit account 12-0600.

Respectfully submitted,

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